Name: Date:
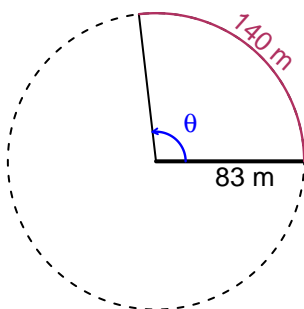
Trig Final (SLTN v670)

- You can use a calculator (like Desmos)
- You should have a unit-circle with special angles and coordinates marked.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The arc length is 140 meters. The radius is 83 meters. What is the angle measure in radians?
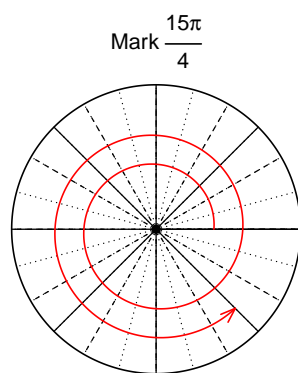

$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$
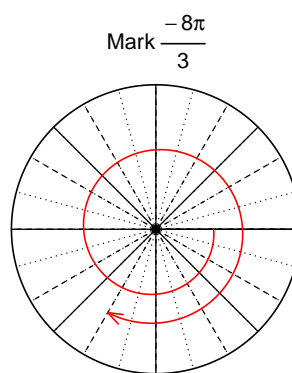
$\theta = 1.687$ radians.

Question 2

Consider angles $\frac{15\pi}{4}$ and $\frac{-8\pi}{3}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(\frac{15\pi}{4}\right)$ and $\cos\left(\frac{-8\pi}{3}\right)$ by using a unit circle (provided separately).

Mark $\dfrac{15\pi}{4}$

Find $\sin(15\pi/4)$

Mark $\dfrac{-8\pi}{3}$
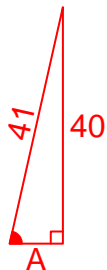
Find $\cos(-8\pi/3)$

$\sin(15\pi/4) = \frac{-\sqrt{2}}{2}$

$\cos(-8\pi/3) = \frac{-1}{2}$

1

Question 3

If $\sin(\theta) = \frac{40}{41}$, and θ is in quadrant II, determine an exact value for $\cos(\theta)$.
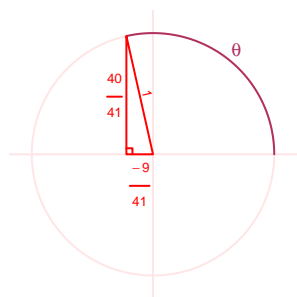
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.

Solve the Pythagorean Equation

$$A^2 + 40^2 = 41^2$$
$$A = \sqrt{41^2 - 40^2}$$
$$A = 9$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant II in a unit circle.

$$\cos(\theta) = \frac{-9}{41}$$

Question 4

A mass-spring system oscillates vertically with an amplitude of 6.59 meters, a frequency of 8.9 Hz, and a midline at $y = -4.68$ meters. At $t = 0$, the mass is at the maximum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 6.59\cos(2\pi 8.9t) - 4.68$$

or

$$y = 6.59\cos(17.8\pi t) - 4.68$$

or

$$y = 6.59\cos(55.92t) - 4.68$$